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ABSTRACT

Findings of a study that examined how effectively instructional leadership and instructional climate predict student learning outcomes are presented in this paper. Surveys to determine principals' self-perceptions and teachers' perceptions of instructional climate were completed by 72 principals and 1,523 teachers. Achievement results for 9,415 students, taken from the Illinois statewide student-assessment program, were available at the third-grade level (56 schools), sixth-grade level (41 schools), and eighth-grade level (15 schools). The dimensions of instructional leadership included: defining mission; managing curriculum and instruction; supervising and supporting teaching; monitoring student progress; and promoting instructional climate. Measured dimensions of instructional climate included accomplishment, recognition, power, and affiliation. Findings demonstrated a significantly positive correlation between principals' self-ratings of instructional leadership and student achievement. The correlations were strongest for academic satisfaction, recognition, accomplishment, and commitment. No significant relationships were found between teacher ratings of instructional leadership and student achievement, though they were generally positive. In conclusion, the findings provide empirical evidence for a strong relationship between instructional leadership and student learning outcomes. (Contains 26 references.) (LMI)

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Instructional Leadership, School Instructional Climate, and Student Learning Outcomes

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Summary

This study describes the relationships among a set of principal self-report measures of instructional leadership and school climate, teacher ratings of instructional leadership and school climate, student ratings of school climate, and student achievement in the areas of reading and mathematics. Student achievement results, taken from the Illinois statewide student assessment program, were available at the third grade level (56 schools), sixth grade level (41 schools), and eighth grade level (15 schools). Analyses were conducted at the school level, the lowest level at which scores on th state test are reported. The total number of participants in this study includes 72 principals, 1,523 teachers, and 9,415 students.

An initial inspection of the zero-order correlations revealed statistically significant relationships between principal self-ratings on five broad dimensions of instructional leadership and student achievement. The correlations were uniformly positive and ranged between .073 and .604. correlations between principal self-ratings of the district instructional climate and student achievement were strongest for Accomplishment, Recognition, Satisfaction, and Commitment. Significant correlations were most evident at the third-grade level.

Inspection of the zero-order correlations revealed no statistically significant relationships between teacher ratings on five broad dimensions of instructional leadership and student achievement, although the correlations were generally positive. A number of the instructional climate scales correlated significantly with student achievement scores: Satisfaction, Commitment, Strength of Climate, and Accomplishment.

Within the student data, statistically significant zero-order correlations were found at the third grade level with commitment, Power (negative), and at the sixth grade level with Affiliation.

Because of aggregation effects (i.e., teacher and student ratings and student achievement scores are averaged across entire schools) the alpha levels (i.e., probability levels) of the correlation coefficients reported here may seriously underestimate the real significance of the relationships described here. In addition, this report presents only zero-order correlations. Work is in progress to examine the prediction levels when scales and data sources (i.e., principals, teachers, students) are multiply combined.

At the present time, it seems reasonable to conclude that the empirical evidence for link between instructional leadership and student learning outcomes is strong, particularly in the early school years.

Instructional Leadership, School Instructional Climate, and Student Learning Outcomes

Introduction

Good literature and bad literature start with the same alphabet. Good writers don't necessarily use more vowels than bad writers. Although Hemingway's style is characterized by short words and short sentences, his true genius is reflected elsewhere. Writing needs to be evaluated not with respect to letters or words, sentences or paragraphs, but with respect to broader determinants that describe how these elements are organized to focus the reader's attention upon a coherent theme or message.

A similar situation exists when it comes to evaluating the quality of instruction a school provides. Most people agree that skillful teachers, a well-planned and developed curriculum, and the availability of appropriate curriculum materials are key elements. But, just as in writing, broader determinants must be considered that integrate these elements into a coherent framework within which learning takes place.

Two determinants on which a great deal of research has focused in the last decade are the quality of instructional leadership provided and the instructional climate of the school itself.

Instructional Leadership. Decades of research in social psychology has convincingly demonstrated that organizations need effective leaders if they are to be successful (see, for example, Ames, 1985; Fiedler, 1964; Vroom, 1976; Yukl, 1981). The importance of leadership for the schools seems largely to have gone ignored until studies of effective schools repeatedly documented the pivotal role of the principal in their success. This led to a closer examination of the principal's role and a better understanding of what instructional leaders do (Blase, 1987; Eberts & Stone, 1988; Hallinger & Murphy, 1985).

Instructional leadership involves the strategic application of knowledge to solve context-specific problems and to achieve the purposes of schooling through others. Although the problems that face instructional leaders are numerous and the contexts in which instructional leaders operate diverse, the argument has been made elsewhere (Krug, 1992; Krug, Ahadi, & Scott, 1991) that instructional leadership can be essentially described in terms of five broad dimensions: defining mission, managing curriculum and instruction, supervising and supporting teaching, monitoring student progress, and promoting instructional climate.

School leaders enter the achievement equation both directly and indirectly. On the one hand, they engage in specific activities related to the management and evaluation of curriculum, teaching staff, and students that directly impact learning. By communicating a sense of mission and purpose and by shaping the school's instructional climate, thereby influencing the attitudes of teachers, students, parents, and the community at large toward education, they increase both student and teacher motivation and indirectly impact learning gains.

Instructional Climate. The importance of the attitudinal infrastructure or instructional climate of the school has attracted a great deal of attention in recent years (Krug, In press; Maehr & Fyans, 1989; Schein, 1984; Sergiovanni & Corbally, 1984; Walberg, 1979). Many researchers have suggested that climate (or culture) is an important variable that can be directed by leaders to achieve organizational objectives. As noted earlier, one of the five elements in our theory of instructional leadership is that effective leaders nurture and develop a climate in which learning is valued. Since most outcomes ultimately have their origin in beliefs about what is possible, the importance of the beliefs of school administrators, teachers, and students upon learning outcomes cannot be underestimated.

The present study was designed to provide a large-scale test of the relationship among leadership, instructional climate, and student learning outcomes. More specifically, it sought answers to the following two questions:

- How effectively do instructional leadership and instructional climate predict student learning outcomes?
- How stable are these effects across grade levels?

In doing so, the study indirectly addressed four other questions:

- To what extent are principal, teacher, and student perceptions complementary, rather than duplicative?
- How are grade-level differences in student perceptions of school climate best treated in the prediction of student learning outcomes at the building level?
- How reliable (i.e., generalizable) a measure results when student and teacher data are aggregated into a single, school index?

- Does the greater reliability of aggregated teacher or student ratings of instructional climate render the self-reports of principals relatively less useful?

Method

Sample

A total of 81 suburban, Chicago-area schools had been recruited for a larger study that focused on instructional leadership behavior of principals, the interrelationship between principal and teacher ratings of instructional leadership, and the interrelationships among principal, teacher, and student perceptions of a school's instructional climate. The breakdown by school level in the original sample was as follows: elementary--74%; middle school/junior high--21%; high school--5%. With respect to enrollment, 20% of the schools had fewer than 300 students, 20% had between 300-400 students, and 60% of the schools had over 500 students. For the present study, data from the four high schools was not used.

Forty percent of the principals (half female, half male) had 1-5 years of experience in the principalship, 40% had 6-15 years of experience, and the remaining 20% had 16 or more years of experience.

Of the 1,523 teachers in the study, about two-thirds were elementary teachers and one-third were middle school/junior high teachers. Roughly one in five was male. With respect to age, the largest single group was in the 40-49 year range. Only about 16% of the entire sample were 50 years of age or older. The sample was predominantly white. Minority teachers represented only about 5% of the total group. More than half had been teaching for 13 years or more and more than half had earned degrees beyond the bachelor's level.

The third segment consisted of all students enrolled in grades 3, 6, and 8 (N = 9,415). The decision to test students at these grades only was dictated by the fact that achievement data was available only at those grade levels.

Variables

During the course of a programmatic course of study that began in 1985, a variety of theory-based instruments have been developed to assess a core set of variables related to instructional leadership, school instructional climate, and related outcome measures. Because the instruments themselves measure various sets, a brief preliminary discussion of the variables themselves will provide a better context for understanding the scope of the study.

As noted earlier, five constructs have been central to our analysis of instructional leadership: defining mission, managing curriculum and instruction, supervising and supporting teaching, monitoring student progress, and promoting instructional climate. Instruments have been developed for assessing each dimension from the perspective of principals, teachers, and superintendents. A brief description of each dimension is presented below.

Defining Mission. The first role of the school's chief executive is explicitly framing school goals, purposes, and mission. A school that has not fully considered how it will go about the process of education has no criteria for judging whether it is successfully engaged in that process.

Managing Curriculum and Instruction. Effective leaders provide information that teachers need to plan their classes effectively and they actively support curriculum development. Although they do not teach, principals need to be aware of the special needs of each instructional area. Without a broad base of knowledge, principals cannot provide the resources teachers and staff need to carry out the school's mission effectively.

Supervising and Supporting Teaching. Although mandates and traditional hierarchical structures have usually assigned principals a narrow, evaluative role with respect to teachers, the effective instructional leader is more broadly oriented to staff development. That is, the effective instructional leader is prospective rather than retrospective regarding staff and focused on what can be, not what was.

Monitoring Student Progress. The school's primary product is a population of graduates who have the technical and life skills they need to cope in an increasingly competitive world. Good instructional leaders need to be aware of the variety of ways in which student progress can and should be assessed. Even more importantly, principals need to use assessment results in ways that help teachers and students improve and that help parents understand where and why improvement is needed.

Promoting Instructional Climate. Those who survive for very long in leadership positions soon learn that their primary objective is to motivate people to do what needs to be done. When the atmosphere of the school is one that makes learning exciting, when teachers and students are both supported for their achievements, and when there is a shared sense of purpose, it is difficult not to learn, particularly in the critical first years of school when lifelong attitudes toward education are forming. Effective school leaders help create that atmosphere.

Although the variables we use to examine instructional climate were originally assessed by Braskamp and Maehr (1985) within the context of work organizations, they translate well to school context. Separate scales report the perceived emphasis in the school on excellence, quality and task orientation (accomplishment), reward of achievements (recognition), competition (power), and sense of community (affiliation). An overall index of the strength or salience of the climate is also obtained. Instruments have been developed for assessing each dimension from the perspective of principals, teachers, and students. In the teacher and student forms, the focus is directly on the school. In the principal form, the climate items are intended to reflect more broadly on the district. A brief description of each dimension is presented below.

Accomplishment. High scores on this variable mean that the school is being very supportive of teachers who try new ideas. Considerable latitude exists for creativity and innovation. The school emphasizes quality education and there is a clear focus on excellence.

Recognition. This variable assesses reinforcement systems within the school. Productivity is visibly and continuously rewarded. Thus, the school not only encourages effort, but also does something concrete about it in terms of a well-regarded reward system.

Power. This variable assesses the distribution and focus of energy within the school. A high score means the school places considerable emphasis on competition. High scores do not necessarily describe a destructive atmosphere, but certainly one in which cooperation is not viewed as the preferred path to achievement.

Affiliation. Sharing of information, involvement in decision making, and mutual cooperative problem solving are some activities that describe an affiliative climate. Teachers and students feel that the school and people within it really care about them.

Scales for assessing principal and teacher satisfaction and principal, teacher, and student commitment were also included in the present study.

Instruments

Instructional Leadership Inventory. Principals completed the Instructional Leadership Inventory (ILI: Maehr & Ames, 1988), a self-report measure designed to assess the five dimensions of instructional leadership previously identified. Principals indicate how frequently they perform each of 48 instructional leadership behaviors on a five point Likert scale. The response alternatives include "Almost Never," "Seldom," "Sometimes," "Frequently," and

"Almost Always." Reliabilities range between .74 and .85 (median = .80). Krug (1989) summarizes a series of studies that support the validity of the ILI as a measure of instructional leadership. These studies include correlations with other self-report measures of instructional leadership, correlations with superintendent ratings of instructional leadership, and correlations with relevant external criteria.

School Administrator Assessment Survey. Principals also completed the School Administrator Assessment Survey (SAAS: Braskamp & Maehr, 1985), a self-report measure designed to measure individual motivation, perceptions of current job opportunities, climate, satisfaction, and commitment. The development and validation of these scales is well documented in other sources (Braskamp & Maehr, 1985; Hensler & Krug, 1988; Maehr, 1984; Maehr & Braskamp, 1986; Stonehouse, 1987; Suddarth, 1987) to which the interested reader is referred.

Instructional Climate Inventory (Form T). Teachers completed the teacher form of the Instructional Climate Inventory (ICI-T: Maehr, Braskamp, & Ames, 1988). The ICI-T contains 48 items that are parallel to those in the principal form. The only difference between these two sets of items is the prompt. Teachers are asked "To what extent do administrators in this school..." and are provided with the same five response options. The ICI-T also includes 60 items designed to assess the school's climate. These items parallel those in the SAAS and were adapted from a more general measure of organizational culture developed by Braskamp and Maehr (1985). Satisfaction and commitment are also measured by the ICI-T. Reliabilities (scale internal consistency coefficients) range between .51 and .91 (median = .85).

Instructional Climate Inventory (Form S). Students in grades three, six, and eight completed the student form of the Instructional Climate Inventory (ICI-S: Maehr, Braskamp, & Ames, 1988). The ICI-S contains 20 items that assess both school climate and commitment.

Illinois Goal Assessment Program. Students in third, sixth, and eighth grade took the reading and mathematics sections of the Illinois Goal Assessment Program (IGAP) as part of the statewide census assessment of public schools each spring. The technical development, reliability, and validity data for these tests are fully documented in the Technical Manual (Illinois State Board of Education, 1990). The design of both tests reflects the most current thinking about how reading and mathematics can best be assessed. The Illinois program uses a matrix sampling design in which students within the classroom complete different item sets. Results are equated and aggregated at the school level. Individual student scores are not reported.

Procedure

Controlling Grade Effects in Student Perceptions of Instructional Climate. When the responses of students to questions regarding their attitudes toward and beliefs about the school are examined across grade levels, there are clear and important differences. Recently, Krug (In press) has presented evidence from a nationally-sampled group of schools that suggests the relationship between climate measures and grade is best described as a quadratic function. Students' attitudes toward school decline markedly through the early high school years, where they reach a minimum and begin to increase. The validity of this pattern has been confirmed by others independently (Walberg, 1979; Walberg, House, & Steele, 1973).

When a study focuses on an individual classroom, or when only students at a particular grade level are being studied, these differences are not problematic. However, when we attempt to characterize an entire school by aggregating across students in many different grades, it is a problem. To control for these differences, we have customarily transformed student scores prior to aggregation. The transformations bring the raw score to a standard score scale based on grade-appropriate norms that have been developed in the course of using these instruments with approximately 40,000 students.

A similar situation exists with regard to teacher perceptions. Elsewhere, data have been presented to show that differences in perceptions of school climate between elementary and secondary teachers are greater than differences between U. S. and Australian teachers overall (Krug, 1991). Norms have been developed for use with the teacher form also and were applied in the present study. However, because of the preponderance of elementary schools in the study and because the corrections are small relative to the student norms, the use of standard scores for teachers probably had little impact on the outcomes of the study.

Aggregation of Climate Measures. Since achievement data were available only at the school level, teacher and student measures of climate needed to be brought to the same level for purposes of analysis. When test elements are joined or combined in some way, the resulting score is often referred to as an aggregated score. The psychometric characteristics of that score is dependent both on the test elements and the way in which they are combined. The simplest example of aggregation occurs when responses on individual test items are combined to form a test score. If the test items are drawn from the same universe (technically if responses generalize predictably from one item to another), then the test score will usually be much more reliable than a score on any individual item. On the other hand, if the items that are

combined to form a total score are drawn from very different content areas, the composite score may have little or no reliability.

A different kind of aggregation occurs when test scores are combined or averaged across individuals. However, the same principles apply: if test scores generalize predictably from one individual to another, then the aggregate score will be more reliable than the score of any individual score. Student achievement scores, since they reflect the effects of (relatively) uniform instructional practices, usually aggregate to form reliable classroom or school averages. For example, studies of the tests used within the Illinois Goal Assessment Program, have found school level scores to have reliabilities that range above .90 when results from a classroom or an entire school student scores are combined (Illinois State Board of Education, 1991).

Prior to aggregating the teacher and student data, analyses were carried out to test the general hypothesis that scores were generalizable across teachers and students. Results are shown in Tables 1 and 2. For teachers, a random sample of 8 teachers was drawn from each of 78 schools for the analyses of variance. These results are shown in Part 1 of the table. The first column of each ANOVA table identifies the variance source. The remaining columns of each table present, in the following order, the sum of squares, degrees of freedom, mean square, and F value.

From these variance component estimates (i.e., the mean squares), coefficients were calculated to illustrate the level of generalizability possible when different numbers of teacher ratings are aggregated. These results are shown in Part 2 of the table. For students, a random sample of 30 students was drawn from each of 71 schools for the analyses of variance. The results of the student analyses are reported in the same format as those of the teachers.

After aggregation, a total of 30 psychological variables were available for each school in the study: (1) 5 leadership measures, 5 climate measures, plus satisfaction and commitment measures based on the self-reports of the principal; (2) 5 aggregated leadership measures, 5 aggregated climate measures, plus aggregated satisfaction and commitment measures from the teachers in that school; (3) 5 aggregated climate measures plus an aggregated commitment measure from the students in that school. In addition, aggregated IGAP reading and mathematics achievement test scores for students at grades three, six, and eight represented the dependent variables. A series of analyses were then performed to examine the interrelationships among the variables.

As a first step in understanding the structure of the domain, a factor analysis of 25 predictor variables was conducted. The satisfaction and commitment variables were eliminated from this analysis. Five roots of the unreduced correlation matrix were greater than 1.0. Communalities for a five-factor solution were interatively obtained and the resulting matrix was rotated to oblique simple structure as defined by the Oblimin criterion. Results from this analysis are reported in Tables 3 (factor pattern), 4 (factor structure), and 5 (factor correlations).

Next, zero-order correlations between student achievement and principal self-ratings, teacher ratings, and student ratings were calculated. Results are presented in Tables 6, 7, and 8, respectively.

Finally, a series of multiple correlations were conducted in which the student achievement scores served as the criteria and the psychological variables and the predictors. A step-wise approach was used. However, because of the relatively limited number of observations after aggregation and the possibility of capitalizing on spurious relationships, no variable was allowed to enter an equation with a sign opposite to that of the zero-order relationship. That is, moderator relationships, which are notoriously unreliable even in large data sets, were not permitted.

Results

Reliability of Aggregated Teacher and Student Scores. As Tables 1 and 2 show, the level of reliability obtained in the aggregate scores is influenced by the number of scores included. For example, the reliability of a school average rating on the Defining Mission scale is .82 when results from 10 teachers are combined. This rises to .88 when 15 ratings are combined, .90 when 20 ratings are combined, and to .96 when 50 ratings are combined.

A similar pattern is obtained for students. On the Accomplishment scale, for example, the reliability of an score based on 25 students is estimated to be .88, rising to .97 when results from 100 students are combined.

Factor Analysis of Predictor Variables. Table 3 presents the factor pattern matrix for the 25 predictor variables included in the analysis. As the loadings in bold face show, the factors differentiate the variables into four major sets: I: Teacher Ratings, II: Student Ratings, III: Principal Self-Reports of Instructional Climate, and IV: Principal Self-Reports of Instructional Leadership. Factor V, which is relatively less important in terms of explained variance, appears to reflect the degree of conflict within the school as perceived by students and teachers.

The factor pattern shows very clean discrimination among the four sets, indicating that the four represent functionally independent dimensions of perception. However, the factor structure matrix, which shows the correlations between variables and factors, shows that there are some important relationships among the different sets. For example, principal self-reports of instructional leadership and instructional climate tend to be positive correlated. And, with the exception of the Power scale, teacher climate measures correlate positively with the principal climate factor (III). As the factor correlations reported in Table 5 show, the correlations among all sets of variables is generally low, but positive.

Zero-Order Correlations. Tables 6, 7, and 8 show zero-order correlations between student achievement and principal self-ratings, teacher ratings, and student ratings, respectively. Correlations that are statistically significant beyond the .05 level (two-tailed significance) are shown in bold to facilitate interpretation of the tables.

Inspection of the zero-order correlations reveals several statistically significant relationships between principal self-ratings on the five instructional leadership dimensions and student achievement. All correlations are positive and range in size between .073 and .604. Correlations between principal self-ratings of the district instructional climate and student achievement are strongest for Accomplishment, Recognition, Satisfaction, and Commitment. Significant correlations are most evident at the third-grade level.

Inspection of the zero-order correlations reveals no statistically significant relationships between teacher ratings of instructional leadership and student achievement, although the correlations are generally positive. On the other hand, a number of the instructional climate scales correlate significantly with student achievement scores: Satisfaction, Commitment, Strength of Climate, and Accomplishment.

Within the student data, statistically significant zero-order correlations appear at the third grade level with Commitment and Power (negative) and at the sixth grade level with Affiliation.

In evaluating the significance levels reported in Tables 6, 7, and 8, keep in mind that they are calculated on the basis of the number of schools correlated, although a single score may represent an aggregate of 100 or more students and similarly large numbers of teachers.

Multiple Regression Results. At the third-grade level, results of multiple regression analyses revealed that, at least at the third-grade level, the level of predictability could be increased considerably by considering linear composites of the predictor variables. Table 9 shows that in

terms of third-grade reading performance, a combination of principals' ratings of accomplishment and supervision of teachers with student ratings of Power and Affiliation yields a multiple correlation of .61, thus explaining 37% of the variance (R2). The third value in parentheses (R2adj) shows the percent of variance explained after adjustment for sample bias and represents a more conservative estimate of the level of predictability. In terms of mathematics, the multiple correlation coefficient reaches .68. Even after adjustment for sample bias, 44% of the variance in mathematics achievement appears to be explainable from a combination of three variables.

At the other grades, the restriction on moderator relationships limited the stepwise procedure to single predictors. The highest zero-order correlations for each criteria were as follows: Grade 6 (reading)--.34; Grade 6 (mathematics)--.32; Grade 8 (reading)--.60. In terms of the Grade 8 mathematics criterion, no zero-order relationship was found to be significant at or beyond the .05 level.

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Table 1

Results of Generalizability Study for Teacher Data

Part 1: Analysis of Variance Summary Tables

Leadership Scales

Defining Mission				
Between Schools	9220.95	77	119.75	4.66
Between Teachers	126.90	7	18.13	0.71
Schools X Teachers	13857.62	539	25.71	
Managing Curriculum And Instruction				
Between Schools	5104.22	77	66.29	2.84
Between Teachers	77.90	7	11.13	0.48
Schools X Teachers	12594.23	539	23.37	
Supervising And Supporting Teaching				
Between Schools	10991.43	77	142.75	3.40
Between Teachers	217.44	7	31.06	0.74
Schools X Teachers	22635.96	539	42.00	
Monitoring Student Progress				
Between Schools	10563.88	77	137.19	3.70
Between Teachers	260.92	7	37.27	1.00
Schools X Teachers	20007.96	539	37.12	
Promoting Instructional Climate				
Between Schools	15389.35	77	199.86	4.09
Between Teachers	495.29	7	70.76	1.45
Schools X Teachers	26339.22	539	48.87	

Instructional Climate Scales

Strength of Climate				
Between Schools	3418.77	77	44.40	2.52
Between Teachers	136.59	7	19.51	1.11
Schools X Teachers	9493.71	539	17.61	

Table 1
(Continued)

Results of Generalizability Study for Teacher Data

Part 1: Analysis of Variance Summary Tables

Accomplishment				
Between Schools	6076.31	77	78.91	3.38
Between Teachers	132.10	7	18.87	0.81
Schools X Teachers	12594.80	539	23.37	
Recognition				
Between Schools	8527.83	77	110.75	3.00
Between Teachers	190.51	7	27.22	0.74
Schools X Teachers	19912.36	539	36.94	
Power				
Between Schools	1257.44	77	16.33	1.82
Between Teachers	46.76	7	6.68	0.74
Schools X Teachers	4848.39	539	9.00	
Affiliation				
Between Schools	9855.70	77	128.00	3.86
Between Teachers	195.86	7	27.98	0.84
Schools X Teachers	17873.16	539	33.16	

Satisfaction/Commitment Scales

Satisfaction				
Between Schools	5351.51	77	69.50	2.09
Between Teachers	285.87	7	40.84	1.23
Schools X Teachers	17901.05	539	33.21	
Commitment				
Between Schools	4289.80	77	55.71	2.09
Between Teachers	112.38	7	16.05	0.60
Schools X Teachers	14357.52	539	26.64	

Table 1
(Continued)

Results of Generalizability Study for Teacher Data

Part 2: Generalizability Coefficients for Various Aggregations of Teacher Data

	Number of Teacher Ratings Aggregated								
SCALE	10	15	20	25	30	35	40	45	50
Leadership Scales									
Defining Mission	.82	.88	.90	.92	.93	.94	.95	.95	.96
Managing Curriculum	.70	.78	.82	.85	.87	.89	.90	.91	.92
Supervising Teaching	.75	.82	.86	.88	.90	.91	.92	.93	.94
Monitoring Student Progress	.77	.84	.87	.89	.91	.92	.93	.94	.94
Promoting Instructional Climate	.80	.86	.89	.91	.92	.93	.94	.95	.95
Instructional Climate Scales									
Strength of Climate	.65	.74	.79	.82	.85	.87	.88	.89	.90
Accomplishment	.74	.81	.85	.88	.90	.91	.92	.93	.94
Recognition	.72	.79	.84	.86	.88	.90	.91	.92	.93
Power	.51	.61	.67	.72	.75	.78	.80	.82	.84
Affiliation	.78	.84	.88	.90	.91	.93	.93	.94	.95
Satisfaction/Commitment Scales									
Satisfaction	.58	.67	.73	.77	.80	.83	.84	.86	.87
Commitment	.58	.67	.73	.77	.80	.83	.84	.86	.87

Note: Based on data from 624 teachers and 78 schools.

Table 2

Results of Generalizability Study for Student Data

Part 1: Analysis of Variance Summary Tables

Instructional Climate Scales

Strength of Climate				
Between Schools	422.78	70	6.04	4.89
Between Students	32.32	29	1.11	0.90
Schools X Students	2505.78	2030	1.23	
Accomplishment				
Between Schools	8415.53	70	120.22	9.73
Between Students	425.49	29	14.67	1.19
Schools X Students	25078.33	2030	12.35	
Recognition				
Between Schools	3837.28	70	54.82	7.56
Between Students	209.75	29	7.23	1.00
Schools X Students	14723.99	2030	7.25	
Power				
Between Schools	1042.54	70	14.89	2.51
Between Students	213.52	29	7.36	1.24
Schools X Students	12065.12	2030	5.94	
Affiliation				
Between Schools	4111.90	70	58.74	9.00
Between Students	129.97	29	4.48	0.69
Schools X Students	13244.93	2030	6.52	

Commitment

Between Schools	4218.41	70	60.26	6.78
Between Students	248.25	29	8.56	0.96
Schools X Students	18056.55	2030	8.89	

Table 2
(Continued)

Results of Generalizability Study for Student Data

Part 2: Generalizability Coefficients for Various Aggregations of Student Data

	Number of Student Ratings Aggregated			
Scale	25	50	75	100
Instructional Climate Scales				
Strength of Climate	.77	.87	.91	.93
Accomplishment	.88	.94	.96	.97
Recognition	.85	.92	.94	.96
Power	.56	.71	.79	.83
Affiliation	.87	.93	.95	.96
Commitment	.83	.90	.93	.95

Note: Based on data from 2,130 students and 71 schools.

Table 3

Factor Pattern Matrix

	I	II	III	IV	V
Principal Leadership Variables					
Defining Mission	.134	- .061	.153	**.632**	.047
Managing Curriculum	.010	.089	.031	**.540**	.025
Supervising Teaching	.091	- .118	.052	**.794**	.054
Monitoring Students	- .046	.280	.120	**.617**	- .175
Promoting Climate	.123	- .099	.056	**.633**	- .062
Principal Climate Variables					
Strength of Climate	.050	- .008	**.790**	.001	.015
Accomplishment	- .068	- .039	**.898**	.027	.106
Recognition	.026	- .010	**.884**	.087	.062
Power	- .167	.025	**- .136**	.199	.123
Affiliation	- .079	.098	**.926**	.038	- .105
Teacher Leadership Variables					
Defining Mission	**.946**	- .022	.039	.119	.066
Managing Curriculum	**.903**	.023	- .004	.112	.055
Supervising Teaching	**1.002**	- .016	- .025	.067	.095
Monitoring Students	**.887**	.097	.050	.016	.081
Promoting Climate	**.909**	.029	- .102	.062	.011
Teacher Climate Variables					
Strength of Climate	**.658**	.098	.043	- .102	- .284
Accomplishment	**.820**	.024	.017	- .103	- .081
Recognition	**.824**	.075	.032	- .057	- .159
Power	**- .022**	.055	.029	- .054	**.672**
Affiliation	**.703**	.012	- .057	- .016	**- .429**
Student Climate Variables					
Strength of Climate	.055	**.781**	.137	- .012	.104
Accomplishment	.114	**.839**	- .104	- .014	.194
Recognition	.016	**.909**	.044	.039	- .087
Power	.014	**.485**	- .031	- .028	**.539**
Affiliation	- .001	**.878**	- .093	.002	- .040

Table 4

Factor Structure Matrix

	I	II	III	IV	V
Principal Leadership Variables					
Defining Mission	.279	.076	.406	.726	- .080
Managing Curriculum	.184	.198	.289	.616	- .039
Supervising Teaching	.183	- .014	.291	.827	- .011
Monitoring Students	.144	.274	.329	.642	- .088
Promoting Climate	.191	- .056	.236	.639	- .094
Principal Climate Variables					
Strength of Climate	.281	.141	.845	.256	- .218
Accomplishment	.117	.095	.862	.270	- .078
Recognition	.236	.135	.903	.339	- .143
Power	- .211	.013	- .146	.144	.217
Affiliation	.182	.173	.928	.275	- .239
Teacher Leadership Variables					
Defining Mission	.942	.187	.285	.246	- .240
Managing Curriculum	.899	.215	.237	.224	- .217
Supervising Teaching	.950	.184	.194	.172	- .197
Monitoring Students	.837	.254	.205	.111	- .133
Promoting Climate	.906	.206	.154	.157	- .257
Teacher Climate Variables					
Strength of Climate	.820	.203	.313	.027	- .537
Accomplishment	.899	.201	.275	.041	- .398
Recognition	.923	.224	.301	.077	- .445
Power	- .227	.191	- .136	- .030	.687
Affiliation	.853	.068	.238	.063	- .664
Student Climate Variables					
Strength of Climate	.184	.817	.206	.073	.243
Accomplishment	.202	.897	.006	.041	.345
Recognition	.207	.883	.170	.094	.119
Power	- .085	.587	- .102	.002	.655
Affiliation	.194	.881	.074	.057	.131

Table 5

Factor Correlation Matrix

	I	II	III	IV	V
I	1.000				
II	.193	1.000			
III	.246	.135	1.000		
IV	.124	.067	.278	1.000	
V	- .316	.212	- .220	.024	1.000

Table 6

Zero-Order Correlations Between Principal Ratings and Student Achievement

	Grade 3		Grade 6		Grade 8	
	Reading	Math	Reading	Math	Reading	Math
Defining Mission	**.360**	.261	.227	.254	.423	.383
Managing Curriculum	.229	.261	.129	.118	.350	.412
Supervising Teaching	**.317**	.259	**.309**	.282	**.604**	.505
Monitoring Students	.072	.137	.136	.188	.456	.440
Promoting Climate	.163	.165	.092	.117	.250	.230
Strength of Climate	.190	.190	- .036	.129	- .207	- .171
Accomplishment	**.370**	**.404**	.215	**.324**	- .146	- .077
Recognition	**.346**	**.309**	.076	.263	- .190	- .195
Power	- .154	- .053	.086	.154	.059	.054
Affiliation	**.271**	.244	.004	.132	- .215	- .163
Satisfaction	**.370**	**.440**	- .116	.162	- .494	- .511
Commitment	**.355**	**.335**	.014	.155	- .339	- .379

Note: Correlations are based on 55-56 schools at third grade, 40-41 schools at sixth grade, and 14-15 schools at eighth grade. Correlations significant at or beyond the .05 level (two-tailed) are shown in bold face.

Table 7

Zero-Order Correlations Between Teacher Ratings and Student Achievement

	Grade 3		Grade 6		Grade 8	
	Reading	Math	Reading	Math	Reading	Math
Defining Mission	.194	.153	- .009	- .033	.107	.095
Managing Curriculum	.125	.121	- .073	- .127	.071	.105
Supervising Teaching	.122	.090	.029	- .076	.227	.203
Monitoring Students	- .040	- .088	- .066	- .166	.263	.267
Promoting Climate	.216	.157	.040	- .086	.222	.129
Strength of Climate	.240	**.283**	.137	.128	- .088	- .042
Accomplishment	**.346**	**.363**	.216	.168	.056	.046
Recognition	.198	.191	.110	- .000	.005	- .079
Power	- .172	- .147	- .057	- .093	- .494	- .379
Affiliation	.206	.195	- .009	- .023	.072	.074
Satisfaction	**.407**	**.393**	.022	.063	- .155	- .226
Commitment	**.319**	**.349**	- .116	.005	.030	.103

Note: Correlations are based on 55 schools at third grade, 40 schools at sixth grade, and 15 schools at eighth grade. Correlations significant at or beyond the .05 level (two-tailed) are shown in bold face.

Table 8

Zero-Order Correlations Between Student Ratings and Student Achievement

	Grade 3		Grade 6		Grade 8	
	Reading	Math	Reading	Math	Reading	Math
Strength of Climate	- .047	.025	.078	- .056	- .028	- .077
Accomplishment	- .090	- .046	.094	- .113	.035	.148
Recognition	- .076	.033	.199	.097	- .135	- .062
Power	**- .315**	**- .311**	.184	.022	- .000	.084
Affiliation	- .007	.111	**.341**	.181	.183	.140
Commitment	**.414**	**.394**	.166	.078	.343	.416

Note: Correlations are based on 55 schools at third grade, 41 schools at sixth grade, and 15 schools at eighth grade. Correlations significant at or beyond the .05 level (two-tailed) are shown in bold face.

Table 9

Results of Multiple Regression Analyses Predicting Student Achievement Measures

Grade 3: Reading (R = .61, R2 = .37, R2adj = .32)

Source	Variable	beta
Principal	Accomplishment	.263
Student	Power	- .622
Student	Affiliation	.465
Principal	Supervise Teaching	.249

Grade 3: Mathematics (R = .68, R2 = .47, R2adj = .44)

Source	Variable	beta
Principal	Accomplishment	.358
Student	Power	- .789
Student	Affiliation	.726